

pyrazolo[3,4]pyrimidyl, benzo(b)thienyl, and the like. These heteroaryl groups may be optionally substituted with one or more substituents.

[0658] The term “substituted” is contemplated to include all permissible substituents of organic compounds, “permissible” being in the context of the chemical rules of valence known to those of ordinary skill in the art. In some cases, “substituted” may generally refer to replacement of a hydrogen with a substituent as described herein. However, “substituted,” as used herein, does not encompass replacement and/or alteration of a key functional group by which a molecule is identified, e.g., such that the “substituted” functional group becomes, through substitution, a different functional group. For example, a “substituted phenyl” must still comprise the phenyl moiety and cannot be modified by substitution, in this definition, to become, e.g., a heteroaryl group such as pyridine. In a broad aspect, the permissible substituents include acyclic and cyclic, branched and unbranched, carbocyclic and heterocyclic, aromatic and nonaromatic substituents of organic compounds. Illustrative substituents include, for example, those described herein. The permissible substituents can be one or more and the same or different for appropriate organic compounds. For purposes of this disclosure, the heteroatoms such as nitrogen may have hydrogen substituents and/or any permissible substituents of organic compounds described herein which satisfy the valencies of the heteroatoms. This disclosure is not intended to be limited in any manner by the permissible substituents of organic compounds.

[0659] Examples of substituents include, but are not limited to, alkyl, aryl, aralkyl, cyclic alkyl, heterocycloalkyl, hydroxy, alkoxy, aryloxy, perhaloalkoxy, aralkoxy, heteroaryl, heteroaryloxy, heteroarylalkyl, heteroaralkoxy, azido, amino, halogen, alkylthio, oxo, acyl, acylalkyl, carboxy esters, carboxyl, carboxamido, nitro, acyloxy, aminoalkyl, alkylaminoaryl, alkylaryl, alkylaminoalkyl, alkoxaryl, arylamino, aralkylamino, alkylsulfonyl, carboxamidoalkylaryl, carboxamidoaryl, hydroxyalkyl, haloalkyl, alkylaminoalkylcarboxy, aminocarboxamidoalkyl, alkoxyalkyl, perhaloalkyl, arylalkyloxyalkyl, and the like.

1. An imaging device, comprising:
 - a source of electromagnetic radiation configured to emit radiation to excite non-steady-state emission in emissive species during emission time periods of the emissive species, the emission time periods being at least 10 nanoseconds;
 - an electromagnetic radiation sensor comprising a plurality of photodetectors arranged in an array of rows and columns, wherein the electromagnetic radiation sensor is configured to sense the non-steady-state emission from the emissive species during the emission time period; and
 - processing circuitry configured to:
 - sequentially read out rows or columns of the array to provide a plurality of time-encoded signals; and
 - identify a characteristic of the emissive species based on a comparison of at least two of the plurality of time-encoded signals.
2. An imaging device as in claim 1, wherein the emissive time periods are at least 100 nanoseconds.
3. An imaging device as in claim 1, wherein the emissive time periods are at least 1 microsecond.

4. An imaging device, comprising:
 - a source of electromagnetic radiation configured to emit radiation to excite non-steady-state emission in emissive species during emission time periods of the emissive species, the emission time periods being at least 10 nanoseconds;
 - an electromagnetic radiation sensor, wherein the electromagnetic radiation sensor is configured to sense the non-steady-state emission from the emissive species during the emission time period; and
 - processing circuitry configured to:
 - globally expose and/or read data from the electromagnetic radiation sensor to provide a plurality of time-encoded signals and
 - identify a characteristic of the emissive species based on a comparison of two or more of the plurality of time-encoded signals.
5. An imaging device as in claim 1, wherein the source of electromagnetic radiation is configured to emit radiation to excite a steady-state emission in a second emissive species.
6. An imaging device as in claim 1, wherein a second source of electromagnetic radiation is configured to emit radiation to excite a steady-state emission in a second emissive species.
7. An imaging device as in claim 1, wherein the second emissive species is the same as the emissive species.
8. An imaging device as in claim 1, wherein the second emissive species is different than the emissive species.
9. An imaging device as in claim 1, wherein the electromagnetic radiation sensor is configured to sense the detectable steady-state emission.
10. An imaging device as in claim 1, wherein the processing circuitry is further configured to:
 - generate one or more images based on the plurality of time-encoded signals, and wherein identifying the characteristic of the emissive species is based on the one or more images.
11. An imaging device as in claim 1, wherein the processing circuitry is further configured to:
 - generate a first portion of an image based on time-encoded signals for one or more first rows or one or more first columns of the array;
 - generate a second portion of the image based on time-encoded signals for one or more second rows or one or more second columns of the array, and
 - wherein identifying the characteristic of the emissive species is based on a comparison of the first portion of the image and the second portion of the image.
12. A system configured for identification of a characteristic of a chemical tag, comprising:
 - a chemical tag associated with an article, wherein the chemical tag comprises an emissive species, wherein the emissive species produces a detectable non-steady-state emission during an emission time period of the emissive species under a set of conditions, and wherein the emission time period is at least 10 nanoseconds;
 - an excitation component configured to excite the emissive species under the set of conditions such that the detectable non-steady-state emission, which varies over the image capture time period, is produced;
 - an image sensor configured to detect the detectable non-steady-state emission; and
 - an electronic hardware component configured to convert the detected non-steady state emission into a single image,